

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1). (Currently Amended) A method, comprising:
 - performing repeatedly edge profiling on a program using hardware and software,
 - including directly measuring branch execution frequencies over an entire execution period of the program;
 - detecting profile phase transitions repeatedly, wherein a profile phase transition is an indication that one or more cold program edges have become a corresponding number of hot program edges; and
 - optimizing the program based upon the profile phase transitions and edge profile.
- 2). (Previously Presented) The method of claim 1, wherein performing repeatedly edge profiling comprises:
 - using software to insert edge profiling instructions and arrange profile data;
 - executing the program; and
 - using hardware to update profile phase transitions, and signal phase transitions.
- 3). (Original) The method of claim 2, wherein using software to insert profiling instructions comprises modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.
- 4). (Previously Presented) The method of claim 3, wherein using software to insert profiling instructions further comprises inserting a profile identifier instruction when the profiled edge lacks at least one of a branch instruction; an initialize profile instruction; and a set offset instruction.

- 5). (Original) The method of claim 2, wherein using hardware comprises translating edge profiling instructions into profile update operations.
- 6). (Original) The method of claim 4, further comprising:
loading a profile information register with a base address, an offset value, a trigger-counter, and a flag.
- 7). (Original) The method of claim 5, further comprising:
intercepting with hardware the profiling instructions;
generating a profile update operation; and
updating profile counters.
- 8). (Previously Presented) The method of claim 1, wherein detecting profile phase transitions repeatedly, comprises generating an interrupt signal by the hardware when the profile phase transition occurs.
- 9). (Original) The method of claim 8, further comprising:
determining if a program edge is hot, comprising
determining if the profiling instruction is executed, and
updating profiling counters associated with the profiling instruction;
determining if a cold edge becomes a hot edge, comprising
incrementing and decrementing trigger counters, and
detecting if trigger counters overflow and underflow;
preventing a false phase transition by detecting trigger counters underflow.

- 10). (Currently Amended) A system, comprising:
- a processor pipeline to generate a profile ID for each profiled edge, and generate profile update operations;
- a profile information register coupled to the processor pipeline;
- a first logic device to accept the profile update operations and profile ID to generate a memory buffer address;
- a profile cache to accept the buffer address connected to the first logic device; and
- a second logic device coupled to the profile cache configured to generate a phase transition interrupt signal,
- wherein the system performs edge profiling on a program including directly measuring branch execution frequencies over an entire execution period of the program, detects profile phase transitions repeatedly, wherein a profile phase transition is an indication that one or more cold program edges have become a corresponding number of hot program edges, and optimizes the program based upon the profile phase transitions.
- 11). (Original) The system of claim 10, wherein the processor pipeline
- executes the program;
- intercepts profiling instructions and updates profile counters; and
- updates profile phase transition trigger counters, and
- signals phase transitions.
- 12). (Original) The system of claim 11, wherein the software inserts edge profiling instructions for modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.

- 13). (Original) The system of claim 12, wherein the software while inserting edge profiling instructions, also inserts a profile identifier instruction when the profiled edge does not have a branch instruction; an initialize profile instruction; and a set offset instruction.
- 14). (Original) The system of claim 11, wherein the processor translates edge profiling instructions into profile update operations.
- 15). (Original) The system of claim 13, wherein the processor pipeline loads a profile information register with a base address, an offset value, a trigger-counter, and a flag.
- 16). (Original) The system of claim 14, wherein the processor pipeline:
 - intercepts the profiling instructions;
 - generates a profile update operation; and
 - updates profile counters.
- 17). (Original) The system of claim 10, wherein the logic device generates an interrupt signal when the profile phase transition occurs.
- 18). (Previously Presented) The system of claim 17, wherein the processor:
 - determines if a program edge is hot, by determining if the profiling instruction is executed,
 - updating profile counters associated with the profiling instruction, and determining if the trigger counters overflow;
 - determines if a cold edge becomes a hot edge, comprising
 - incrementing and decrementing trigger counters,
 - detecting if trigger counters overflow and underflow;
 - prevents a false phase transition by detecting trigger counters underflow.

19). (Currently Amended) A computer-readable medium having stored thereon a plurality of instructions, said plurality of instructions when executed by a computer, cause said computer to perform:

performing repeatedly edge profiling on a program, including directly measuring branch execution frequencies over an entire execution period of the program;

detecting profile phase transitions repeatedly, wherein a profile phase transition is an indication that one or more cold program edges have become a corresponding number of hot program edges; and

optimizing the program based upon the profile phase transitions and edge profile.

20). (Original) The computer-readable medium of claim 19 having stored thereon additional instructions, said additional instructions when executed by a computer for using hardware and software to perform edge profiling on a program, cause said computer to further perform:

using software to insert edge profiling instructions and arrange profile data;

executing the program; and

using hardware to update profile phase transitions, and signal phase transitions.

21). (Original) The computer-readable medium of claim 20 having stored thereon additional instructions, said additional instructions when executed by a computer for using software to insert edge profiling instructions, cause said computer to further perform:

modifying branch instructions to assign an identifier to one or more profiled

edges, and to assign a value to an edge selection field.

22). (Original) The computer-readable medium of claim 21 having stored thereon additional instructions, said additional instructions when executed by a computer for using software to insert edge profiling instructions, cause said computer to further perform:

inserting a profile identifier instruction; when the profiled edge does not have a branch instruction, an initialize profile instruction, and a set offset instruction.

23). (Original) The computer-readable medium of claim 20, having stored thereon additional instructions, said additional instructions when executed by a computer for using hardware, cause said computer to further perform translating edge profiling instructions into profile update operations.

24). (Original) The computer-readable medium of claim 22 having stored thereon additional instructions, said additional instructions when executed by a computer, cause said computer to further perform:

loading a profile information register with a base address, an offset value, a trigger-counter, and a flag.

25). (Original) The computer-readable medium of claim 23 having stored thereon additional instructions, said additional instructions when executed by a computer, cause said computer to further perform:

intercepting with the hardware the profiling instructions;
generating a profile update operation; and
updating profile counters.

26). (Previously Presented) The computer-readable medium of claim 19 having stored thereon additional instructions, said additional instructions when executed by a computer for detecting profile phase transitions repeatedly, cause said computer to further perform:

generating an interrupt signal by the hardware when the profile phase transition occurs.

27). (Previously Presented) The computer-readable medium of claim 26 having stored thereon additional instructions, said additional instructions when executed by a computer for detecting profile phase transitions-repeatedly, cause said computer to further perform: -

determining if a program edge is hot, comprising

determining if the profiling instruction is executed, and

updating profile counters associated with the profiling instruction;

determining if a cold edge becomes a hot edge, comprising

incrementing or decrementing trigger counters, and

detecting if trigger counters overflow and underflow; and

preventing a false phase transition by detecting trigger counters underflow.